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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/777,139	02/05/2001	Gregory Hagan Moulton	UND004	5504

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William J. Kubida, Esq.
Hogan & Hartson, LLP
1200 17th Street Suite 1500
Denver, CO 80202

EXAMINER

ZAND, KAMBIZ

ART UNIT	PAPER NUMBER
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2132

DATE MAILED: 07/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/777,139

Applicant(s)

MOULTON ET AL.

Examiner

Kambiz Zand

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims


- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10 and 22-24 is/are allowed.
- 6) ☒ Claim(s) 1-9, 11-21 and 25-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Kambiz Zand


Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The text of those sections of Title 35, U.S. Code not included in this section can be found in the prior office action.
2. The prior office actions are incorporated herein by reference. In particular, the observations with respect to claim language, and response to previously presented arguments.
3. Claims 1, 10, 22 and 32 have been amended.
4. Claims 1-36 are pending.
5. Examiner withdraws rejection of claims 1-16 under 35 U.S.C. 112-second paragraphs due to correction by the applicant.

Response to Arguments

6. Applicant's arguments filed 05/24/2005 have been fully considered but they are not persuasive.
 - As per applicant's arguments that "Sicola discloses a system in which two and only two data storage arrays are linked by a dedicated link" is not relevant to the claim language where distribution are across selected set of "storage nodes" because fig.2 and associated text on col.7, lines 47-53 disclose storage subsystems that corresponds to applicant's "storage nodes" and where also examiner considers "storage arrays" of also representing as Applicant's "storage nodes". Therefore the selection of these two nodes that are only two array storage from the total number of "storage nodes" of the system of fig.2 that have

been selected. Examiner suggests if more than two array storage nodes are in the heart of the Applicant's invention such a distinguish features be present in the claim language in a manner that do not raise new issue that would necessitate further search and consideration and having support in the specification.

- As per Applicant's arguments that no distribution of data is being done by Sicola, examiner refers Applicant to col.4, lines 38-43 where "sharing data across the link from one or more storage subsystems" are being done; and where examiner considers "sharing of data" as act of distribution of the data between the nodes that are sharing the original distributed data.
- Therefore Applicant's arguments are not persuasive and the rejection of the non-allowed claims is maintained.

Claim Rejections - 35 USC § 102

7. **Claims 1-4, 6-13, 17-21, 25, 28-36** are rejected under 35 U.S.C. 102(e) as being anticipated by Sicola (6,643,795 B1).

As per claim 1 Sicola (6,643,795 B1) teach a data storage system comprising: a plurality of storage nodes; data storage mechanisms implemented in each storage node; a communication medium linking storage nodes; and a data distributed across a selected set of the storage nodes such that the data remains available irrespective of

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the unavailability of one or more of the storage nodes within the selected set (see abstract; fig.2, 14 and 15 and associated text; col.3, lines 16-54 where data remains available regardless of failure or unavailability of a storage node).

As per claim 2 Sicola (6,643,795 B1) teach the data storage system of claim 1 wherein the data storage mechanisms on at least two storage nodes collectively implement a unitary volume of network storage (see col.3, lines 56-60).

As per claim 3 Sicola (6,643,795 B1) teach the data storage system of claim 1 wherein the communication medium comprises: a public network for receiving access requests for the data storage system; and a private network enabling communication between storage nodes (see col.4, lines 23-32).

As per claim 4 Sicola (6,643,795 B1) teach the data storage system of claim 3 wherein the public network comprises the Internet (see col.4, lines 28-32).

As per claim 6 Sicola (6,643,795 B1) teach the data storage system of claim 1 further comprising: communication processes implemented within each of the storage nodes operable to exchange state information between at least some of the other data storage nodes (see fig.6-7 and associated text).

As per claim 7 Sicola (6,643,795 B1) teach the data storage system of claim 1 wherein

each of the data storage nodes further comprises data structures configured to store state information about one or more other nodes and the communication links between them (see fig.13 and associated text).

As per claim 8 Sicola (6,643,795 B1) teach the data storage system of claim 7 wherein the state information comprises information selected from the group consisting of but not limited to: availability information, capacity information, quality of service information, performance information, geographical location information, network topological location information (see col.17, lines 1-30).

As per claim 9 Sicola (6,643,795 B1) teach the data storage system of claim 8 wherein the set of storage nodes is selected by a first of the storage nodes using the state information stored in the first of the storage nodes (see col.6-7 and as applied to claim 8 above).

As per claim 11 Sicola (6,643,795 B1) teach the data storage system of claim 1 wherein the network comprises: a plurality of first level networks, each first level network coupling multiple storage nodes; and a second level network coupling at least two of the first level networks (see fig.2 and 4 and associated text).

As per claim 12 Sicola (6,643,795 B1) teach the data storage system of claim 11 wherein the first level network comprises a connection selected from the group

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consisting of: Ethernet, fast Ethernet, gigabit Ethernet, Fiber channel, ATM, firewire, Myernet, SCSI, serial, parallel, universal serial bus, and wireless networks (see col.4, lines 27-31).

As per claim 13 Sicola (6,643,795 B1) teach the data storage system of claim 1 further comprising: storage management processes executing on one of the storage nodes to determine state information about each of the set of storage nodes (see fig.13 and associates text; col.17).

As per claim 17 Sicola (6,643,795 B1) teach a method of managing data storage in a network comprising multiple storage nodes, the method comprising the acts of: communicating a storage request to at least one storage node; and causing the at least one storage node to implement the storage request using an arbitrary subset of the storage nodes (see abstract; fig.2, 14 and 15 and associated text; col.3, lines 16-54 where data remains available regardless of failure or unavailability of a storage node).

As per claim 18 Sicola (6,643,795 B1) teach the method of claim 17 further comprising: communicating state information between the multiple storage nodes; and selecting the arbitrary subset of the multiple storage nodes to be used based upon the state information (see fig.2 and 4 and associated text).

As per claim 19 Sicola (6,643,795 B1) teach the method of claim 17 wherein the act of

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implementing the storage request comprises associating error checking and correcting (ECC) code with storage request (see fig.5, 9 and associated text).

As per claim 20 Sicola (6,643,795 B1) teach the method of claim 19 wherein the ECC code is stored in a single network storage node and the unit of data is stored in two or more network storage nodes (see fig.5, 9 and associated text).

As per claim 21 Sicola (6,643,795 B1) teach the method of claim 17 further comprising: retrieving a stored unit of data specified by the storage request; and verifying the correctness of the stored unit of data; upon detection of an error in the retrieved unit of data, retrieving the correct unit of data using data stored in the others of the arbitrary subset of the multiple storage nodes (see col.3, lines 16-67; col.4; col.5, lines 1-15; fig.5, 9 and associated text).

As per claim 25 Sicola (6,643,795 B1) teach the method of claim 17 further comprising moving the stored unit of data from one network storage node to another network storage node after the step of storing (see abstract; col.3 line 16 to col.5 line 15).

As per claim 28 Sicola (6,643,795 B1) teach a data storage system comprising: a peer-to-peer network of storage devices, each storage device having means for communicating state information with other storage devices, at least one storage device comprising means for receiving storage requests from external entities, and at least one

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storage device comprising means for causing read and write operations to be performed on others of the storage devices (see abstract; fig.2, 14 and 15 and associated text; col.3, lines 16-54 where data remains available regardless of failure or unavailability of a storage node).

As per claim 29 Sicola (6,643,795 B1) teach the system of claim 28 wherein each of the storage devices comprises means for causing read and write operations to be performed on others of the storage devices (see fig.1-3 and associated text).

As per claim 30 Sicola (6,643,795 B1) teach the system of claim 28 wherein each of the storage devices comprises data structures defined to configure at least two geographically distant ones of the data storage devices as a unitary volume of storage (see col.6, lines 63-67 and col.7, lines 1-16 where remote corresponds to applicant's geographically distance).

As per claim 31 Sicola (6,643,795 B1) teach the system of claim 30 further comprising: a network coupling to each of the data storage devices; and a storage controller coupled to the network for logically combining the at least two data storage devices into a single logical storage device (see col.7, lines 17-47 and as applied to claim 30 above).

As per claim 32 Sicola (6,643,795 B1) teach a distributed data storage array comprising: a plurality of network connected storage nodes; a network interface within

each storage node for receiving data and control information from other storage nodes; a network interface within at least one storage node for receiving data storage access requests from external sources; and storage management processes within the at least one storage node operable to distribute data storage for a logically contiguous quantity of data across multiple storage nodes (see abstract; fig.2, 14 and 15 and associated text; col.3, lines 16-54 where data remains available regardless of failure or unavailability of a storage node).

As per claim 33 Sicola (6,643,795 B1) teach a data storage system implemented on top of a plurality of networked computer systems and a communication network, wherein each of the networked computer systems implements a storage node and comprises: a processor for processing data according to program instructions; a network interface coupled to the processor and the network for communicating data with external entities, including other storage nodes, across the network; memory coupled to the processor, the memory comprising storage space configured to store data and instructions used by the processor; one or more mass storage devices coupled to the processor; a communication process comprising program instructions executing in the storage node and in communication with the network interface to provide an interface to communicate data storage access requests and responses with the external entities; storage management processes comprising program instructions executing in the storage node and responsive to the received data storage access requests and in communication with the network interface to distribute and coordinate data storage

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operations with external storage nodes (see abstract; fig.2, 14 and 15 and associated text; col.3, lines 16-54 where data remains available regardless of failure or unavailability of a storage node).

As per claim 34 Sicola (6,643,795 B1) teach the system of claim 33 wherein the storage management processes include processes that communicate with the external storage nodes to provide fault-tolerant distribution of data across the a plurality of storage nodes col.6, lines 63-67 and col.17, lines 1-17).

As per claim 35 Sicola (6,643,795 B1) teach the system of claim 33 wherein the storage management processes include processes for distributing data redundantly to protect against faults that make one or more storage nodes unavailable (see abstract; col.3, lines 16-67; col.4 and col.5, lines 1-14).

As per claim 36 Sicola (6,643,795 B1) teach the system of claim 33 wherein the storage management processes includes fault recovery processes, wherein the fault recovery processes respond to a fault condition by communicating with at least one of the external storage nodes to make available a set of data that would otherwise be unavailable as a result of the fault condition (see fig.5, 9 and associated text; col.3, lines 45-55).

Claim Rejections - 35 USC § 103

8. **Claims 5** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sicola (6,643,795 B1) in view of Laursen et al (5,805,804 A).

As per claim 5 Sicola (6,643,795 B1) teach the data storage system having a private network having IP (internet capabilities) as applied to claim 1, 3 and 4 above but do not disclose wherein the private network comprises a virtual private network implemented over the Internet. However Laursen et al (5,805,804 A) disclose a virtual private network implemented over the Internet (see fig.2 and associated text). It would have been obvious to one of ordinary skilled in the art at the time the invention was made to utilize Laursen's virtual private network over internet in Sicola's storage site failover capability in order to provide a distributed client-server computing and access to the data over asymmetric real-time networks.

9. **Claims 14-16 and 26-27** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sicola (6,643,795 B1) in view of Dugan et al (6,779,030 B1).

As per claims 14-16 and 26-27 Sicola (6,643,795 B1) teach the data storage system of claim 1 as applied above but do not disclose explicitly wherein the communication medium comprises a secure communication medium, implementing an authentication protocol between linked storage nodes and cryptographic security between linked storage nodes. However Dugan et al (6,779,030 B1) disclose wherein the communication medium comprises a secure communication medium (see col.64, lines

54-60), implementing an authentication protocol between linked storage nodes and cryptographic security between linked storage nodes (see col.74, lines 31-35). It would have been obvious to one of ordinary skilled in the art at the time the invention was made to utilize Dugan's secure cryptographic process in Scicola's storage system in order to provide content privacy such as voice privacy (see col.74, line 33-34).

Allowable Subject Matter

10. Claims 10 and 22-24 are allowed.

Conclusion

11. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

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12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kambiz Zand whose telephone number is (571) 272-3811. The examiner can normally be reached on Monday-Thursday (8:00-5:00). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gilberto Barron can be reached on (571) 272-3799. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kambiz Zand

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